Cut B2

SEQUENCE LISTING

<110> Arnold, Frances H.
Joo, Hyun
Lin, Zhanglin

<120> Oxygenase Enzymes and Screening Method

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<140> 09/246,451
<141> 1999-02-09

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Asn Leu Ser Ala Gly Val Gln Glu Ala Trp Ala Val Leu Gln Glu Ser
        35                  40                  45
Asn Val Pro Asp Leu Val Trp Thr Arg Cys Asn Gly Gly His Trp Ile
    50                  55                  60
Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg His
65                  70                  75                  80
Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala Tyr
                85                  90                  95
Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe Arg
            100                 105                 110
Ala Leu Ala Asn Gln Val Val Gly Met Pro Val Val Asp Lys Leu Glu
        115                 120                 125
Asn Arg Ile Gln Glu Leu Ala Cys Ser Leu Ile Glu Ser Leu Arg Pro
    130                 135                 140
Gln Gly Gln Cys Asn Phe Thr Glu Asp Tyr Ala Glu Pro Phe Pro Ile
145                 150                 155                 160
Arg Ile Phe Met Leu Leu Ala Gly Leu Pro Glu Glu Asp Ile Pro His
                165                 170                 175
Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met Thr
            180                 185                 190
Phe Ala Glu Ala Lys Glu Ala Leu Tyr Asp Tyr Leu Ile Pro Ile Ile
        195                 200                 205
Glu Gln Arg Arg Gln Lys Pro Gly Thr Asp Ala Ile Ser Ile Val Ala
    210                 215                 220
Asn Gly Gln Val Asn Gly Arg Pro Ile Thr Ser Asp Glu Ala Lys Arg
225                 230                 235                 240
Met Cys Gly Leu Leu Leu Val Gly Gly Leu Asp Thr Val Val Asn Phe
                245                 250                 255
Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg Gln
            260                 265                 270
Glu Leu Ile Glu Arg Pro Glu Arg Ile Pro Ala Ala Cys Glu Glu Leu
        275                 280                 285
Leu Arg Arg Phe Ser Leu Val Ala Asp Gly Arg Ile Leu Thr Ser Asp
    290                 295                 300
Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu Leu
305                 310                 315                 320
Pro Gln Met Leu Ser Gly Leu Asp Glu Arg Glu Asn Ala Cys Pro Met
                325                 330                 335
His Val Asp Phe Ser Arg Gln Lys Val Ser His Thr Thr Phe Gly His
            340                 345                 350
Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile Ile
        355                 360                 365
Val Thr Leu Lys Glu Trp Leu Thr Arg Ile Pro Asp Phe Ser Ile Ala
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            20                  25                  30
Asn Leu Ser Ala Gly Val Gln Glu Ala Trp Ala Val Leu Gln Glu Ser
        35                  40                  45
Asn Val Pro Asp Leu Val Trp Thr Arg Cys Asn Gly Gly His Trp Ile
    50                  55                  60
Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg His
65                  70                  75                  80
Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala Tyr
                85                  90                  95
Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe Arg
            100                 105                 110
Ala Leu Ala Asn Gln Val Val Gly Met Pro Val Val Asp Lys Leu Glu
        115                 120                 125
Asn Arg Ile Gln Glu Leu Ala Cys Ser Leu Ile Glu Ser Leu Arg Pro
    130                 135                 140
Gln Gly Gln Cys Asn Phe Thr Glu Asp Tyr Ala Glu Pro Phe Pro Ile
145                 150                 155                 160
Arg Ile Phe Met Leu Leu Ala Gly Leu Pro Glu Glu Asp Ile Pro His
                165                 170                 175
Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met Thr
            180                 185                 190
Phe Ala Glu Ala Lys Glu Ala Leu Tyr Asp Tyr Leu Ile Pro Ile Ile
        195                 200                 205
Glu Gln Arg Arg Gln Lys Pro Gly Thr Asp Ala Ile Ser Ile Val Ala
    210                 215                 220
Asn Gly Gln Val Asn Gly Arg Pro Ile Thr Ser Asp Glu Ala Lys Arg
225                 230                 235                 240
Met Cys Gly Leu Leu Leu Val Gly Gly Leu Asp Thr Val Val Asn Phe
                245                 250                 255
Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg Gln
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            260                 265                 270
Glu Leu Ile Glu Arg Pro Glu Arg Ile Pro Ala Ala Cys Glu Glu Leu
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Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu Leu
305                 310                 315                 320
Pro Gln Met Leu Ser Gly Leu Asp Glu Arg Lys Asn Ala Cys Pro Met
                325                 330                 335
His Val Asp Phe Ser Arg Gln Lys Val Ser His Thr Thr Phe Gly His
            340                 345                 350
Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile Ile
        355                 360                 365
Val Thr Leu Lys Glu Trp Leu Thr Arg Ile Pro Asp Phe Ser Ile Ala
    370                 375                 380
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Ala Leu Pro Leu Val Trp Asp Pro Ala Thr Thr Lys Ala Val
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        35                  40                  45
Asn Val Pro Asp Leu Val Trp Thr Arg Cys Asn Gly Gly His Trp Ile
    50                  55                  60
Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg His
65                  70                  75                  80
Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala Tyr
                85                  90                  95
Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe Arg
            100                 105                 110
Ala Leu Ala Asn Gln Val Val Gly Met Pro Val Val Asp Lys Leu Glu
        115                 120                 125
Asn Arg Ile Gln Glu Leu Ala Cys Ser Leu Ile Glu Ser Leu Arg Pro
    130                 135                 140
Gln Gly Gln Cys Asn Phe Thr Glu Asp Tyr Ala Glu Pro Phe Pro Ile
145                 150                 155                 160
Arg Ile Phe Met Leu Leu Ala Gly Leu Pro Glu Glu Asp Ile Pro His
                165                 170                 175
Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met Thr
            180                 185                 190
Phe Ala Glu Ala Lys Glu Ala Leu Tyr Asp Tyr Leu Ile Pro Ile Ile
        195                 200                 205
Glu Gln Arg Arg Gln Lys Pro Gly Thr Asp Ala Ile Ser Ile Val Ala
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    210                 215                 220
Asn Gly Gln Val Asn Gly Arg Pro Ile Thr Ser Asp Glu Ala Lys Arg
225                 230                 235                 240
Met Cys Gly Leu Leu Leu Val Gly Gly Leu Asp Thr Val Val Asn Phe
                245                 250                 255
Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg Gln
            260                 265                 270
Glu Leu Ile Glu Arg Pro Glu Leu Ile Pro Ala Ala Cys Glu Glu Leu
        275                 280                 285
Leu Arg Arg Phe Ser Leu Val Ala Asp Gly Arg Ile Leu Thr Ser Asp
    290                 295                 300
Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu Leu
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Pro Gln Met Leu Ser Gly Leu Asp Glu Arg Lys Asn Ala Cys Pro Met
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His Val Asp Phe Ser Arg Gln Lys Val Ser His Thr Thr Phe Gly His
            340                 345                 350
Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile Ile
        355                 360                 365
Val Thr Leu Lys Glu Trp Leu Thr Arg Ile Pro Asp Phe Ser Ile Ala
    370                 375                 380
Pro Gly Ala Gln Ile Gln His Lys Ser Gly Ile Val Ser Gly Val Gln
385                 390                 395                 400
Ala Leu Pro Leu Val Trp Asp Pro Ala Thr Thr Lys Ala Val
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Asn Leu Ser Ala Gly Val Gln Glu Ala Trp Ala Val Leu Gln Glu Ser
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Asn Val Pro Asp Leu Val Trp Thr Arg Cys Asn Gly Gly His Trp Ile
    50                  55                  60
Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg His
65                  70                  75                  80
Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala Tyr
                85                  90                  95
Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe Arg
            100                 105                 110
Ala Leu Ala Asn Gln Val Val Gly Met Pro Val Val Asp Lys Leu Glu
        115                 120                 125
Asn Arg Ile Gln Glu Leu Ala Cys Ser Leu Ile Glu Ser Leu Arg Pro
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Gln Gly Gln Cys Asn Phe Thr Glu Asp Tyr Ala Glu Pro Phe Pro Ile
145                 150                 155                 160
Arg Ile Phe Met Leu Leu Ala Gly Leu Pro Glu Glu Asp Ile Pro His
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                165                 170                 175
Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met Thr
            180                 185                 190
Phe Ala Glu Ala Lys Glu Ala Leu Tyr Asp Tyr Leu Ile Pro Ile Ile
        195                 200                 205
Glu Gln Arg Arg Gln Lys Pro Gly Thr Asp Ala Ile Ser Ile Val Ala
    210                 215                 220
Asn Gly Gln Val Asn Gly Arg Pro Ile Thr Ser Asp Glu Ala Lys Arg
225                 230                 235                 240
Met Phe Gly Leu Leu Leu Val Gly Gly Leu Asp Thr Val Val Asn Phe
                245                 250                 255
Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg Gln
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Glu Leu Ile Glu Arg Pro Glu Arg Ile Pro Ala Ala Cys Glu Glu Leu
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Leu Arg Arg Phe Ser Leu Val Ala Asp Gly Arg Ile Leu Thr Ser Asp
    290                 295                 300
Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu Leu
305                 310                 315                 320
Pro Gln Met Leu Ser Gly Leu Asp Glu Arg Lys Asn Ala Cys Pro Met
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His Val Asp Phe Ser Arg Gln Lys Val Ser His Thr Thr Phe Gly His
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Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile Ile
        355                 360                 365
Val Thr Leu Lys Glu Trp Leu Thr Arg Ile Pro Asp Phe Ser Ile Ala
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Pro Gly Ala Gln Ile Gln His Lys Ser Gly Ile Val Ser Gly Val Gln
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35 40 45
Gly Cys Asp Ala Ser Ile Leu Leu Asp Asn Thr Thr Ser Phe Arg Thr
50 55 60
Glu Lys Asp Ala Phe Gly Asn Ala Asn Ser Ala Arg Gly Phe Pro Val
65 70 75 80
Ile Asp Arg Met Lys Ala Ala Val Glu Ser Ala Cys Pro Arg Thr Val
85 90 95
Ser Cys Ala Asp Leu Leu Thr Ile Ala Ala Gln Gln Ser Val Thr Leu
100 105 110
Ala Gly Gly Pro Ser Trp Arg Val Pro Leu Gly Arg Arg Asp Ser Leu
115 120 125
Gln Ala Phe Leu Asp Leu Ala Asn Ala Asn Leu Pro Ala Pro Phe Phe
130 135 140
Thr Leu Pro Gln Leu Lys Asp Ser Phe Arg Asn Val Gly Leu Asn Arg
145 150 155 160
Ser Ser Asp Leu Val Ala Leu Ser Gly Gly His Thr Phe Gly Lys Asn
165 170 175
Gln Cys Arg Phe Ile Met Asp Arg Leu Tyr Asn Phe Ser Asn Thr Gly
180 185 190
Leu Pro Asp Pro Thr Leu Asn Thr Thr Tyr Leu Gln Thr Leu Arg Gly

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        195                 200                 205
Leu Cys Pro Leu Asn Gly Asn Leu Ser Ala Leu Val Asp Phe Asp Leu
    210                 215                 220
Arg Thr Pro Thr Ile Phe Asp Asn Lys Tyr Tyr Val Asn Leu Glu Glu
225                 230                 235                 240
Gln Lys Gly Leu Ile Gln Ser Asp Gln Glu Leu Phe Ser Ser Pro Asp
                245                 250                 255
Ala Thr Asp Thr Ile Pro Leu Val Arg Ser Phe Ala Asn Ser Thr Gln
            260                 265                 270
Thr Phe Phe Asn Ala Phe Val Glu Ala Met Asp Arg Met Gly Asn Ile
        275                 280                 285
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    290                 295                 300
Val Asn Ser Asn Ser
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